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<b>CONTROLS FOR SAFE HOT WORK</b>	<b>Manual</b>	<b>ESHQ</b>
	<b>Document</b>	<b>TFC-ESHQ-FP-C-01, REV A-10</b>
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	<b>Issue Date</b>	<b>April 28, 2010</b>
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## [Ownership matrix](#)

### **1.0 PURPOSE AND SCOPE**

(7.1.1, 7.1.2, 7.1.3, 7.1.4, 7.1.4, 7.1.6, 7.1.7, 7.1.8, 7.1.10)

This procedure applies to all Tank Operations Contractor's (TOC) and subcontractor's hot work and outlines required controls for safe hot work. Hot work is classified as "high hazard" or "low hazard."

- High hazard hot work includes electric arc, oxy-fuel gas welding/cutting operations, and heavy grinding.
- Low hazard hot work includes brazing, light grinding, tig welding, or similar low energy activities.

### **2.0 IMPLEMENTATION**

This procedure is effective on the date shown in the header.

### **3.0 RESPONSIBILITIES**

Responsibilities are contained within Section 4.0.

### **4.0 PROCEDURE**

1. If the classification of an operation is not clear, the job supervisor, in consultation with the fire protection engineer (FPE), determines the hazard category (e.g., high or low).
2. To the greatest extent practical, authorized personnel in shops using designated hot work areas will perform hot work.
3. Where hot work must be performed outside such designated areas, the location will be made fire-safe by removing combustibles or by protecting combustibles from ignition sources and providing designated trained fire watches.
4. The safety precautions for activities that are neither high nor low hazard (as defined in this procedure), such as pedestal/small bench grinders, sanders, and soldering, will be determined by the job supervisor in consultation with the FPE.
5. A fire watch is always required during the performance of hot work outside a designated hot work area, unless otherwise authorized in advance by the job supervisor and the TOC FPE.
6. If the hot work is to be performed in any radiological area (radioactive buffer area, contamination area, high contamination area, radioactive material area, or soil contamination area) within the scope of the Documented Safety Analysis (DSA), an Unreviewed Safety Question (USQ) is required to be performed. The USQ can be on the Hot Work Permit alone or with the Permit being part of the USQ for the entire work scope. The TOC FPE's signature is required on the Hot Work Permit, and the FPE will

ensure that the USQ has been performed on the intended work prior to signing the Hot Work Permit.

7. Those performing hot work must wear fire retardant/resistant personal protective equipment (e.g., fire retardant/resistant coveralls, jacket (brown for non-radiological areas and red for radiological areas), or leathers (in non-radiological areas only), etc.), unless otherwise approved by the job supervisor and the FPE.
8. For “low hazard” hot work, cotton long sleeve shirt and/or fire resistant/leather full front aprons may be utilized.

#### 4.1 Prepare for Hot Work

(7.1.4, 7.1.9)

**WARNING!** Do not allow cutting, welding, or heating of: (1) metal partitions, walls, ceilings, or roof assemblies with combustible covering(s) or with combustible sandwich-type panel construction or (2) any surface covered by a preservative coating whose flammability is not known. Both of the activities require written safeguards from the Fire Marshal’s Office in the form of a permit before the heat producing activity is performed.

**NOTE:** The TOC FPEs are Deputized Fire Marshals and inspect, act, and issue Permits with the full authority of the Office of the Hanford Fire Marshal.

Job Supervisor

1. Survey the area to identify combustible materials and hazardous areas at the work site and prepare the work site for the job.

**NOTE:** Any material that will ignite and burn is considered combustible. The most common materials likely to become involved in a fire are combustible building construction (e.g., floors, partitions, roof assemblies); combustible contents (e.g., wood, paper, textiles, plastics, chemicals, flammable liquids, gases); and combustible ground cover (e.g., grass, brush).

2. If combustibles are present in the work area:
  - a. Relocate the job, or
  - b. Move the combustibles at least 35 feet away from the work, or
  - c. Protect the combustible materials within 35 feet of the work by using non-combustible/fire retardant covers, shields, blankets, or, if appropriate, wet the materials.

**NOTE:** The separation distance and protective measures for “low hazard” hot work shall be as determined by the job supervisor, in consultation with the FPE.

3. Verify all openings or cracks in walls, floors, systems, and equipment within 35 feet of the work are covered or plugged to prevent sparks from reaching adjacent areas.

Job Supervisor/Hot Workers

4. Verify that hot work equipment that is intended for use (e.g., torches, regulators, pressure-reducing valves, manifolds, etc.) is listed or approved by a nationally recognized testing laboratory for the intended use.

Job Supervisor

5. Verify that oxygen-fuel gas systems (e.g., oxygen/acetylene welders) are equipped with listed and/or approved backflow valves, flash arrester, and pressure-relief devices.
6. Verify there is no gas escaping from around the valve of the cylinder. If leaking is observed, stop work and tag cylinder out of service and call vendor to report condition.
7. If the hot work will be performed on pipes or other metal, verify that combustibles that are in contact with the metal are sheltered from ignition caused by heat conduction through the metal or are relocated away from the heat source.
8. If an automatic fire suppression system is installed, verify that it is operable. If there is any question or chance of the hot work being performed in the closed proximity of a sprinkler head and the sprinkler head being activated, call the Hanford Fire Department to provide special precaution support.
9. Verify that the work site has adequate ventilation.
10. Verify that there are no flammable concentrations of gases, vapors, liquids, or dust in the atmosphere.
11. If there are smoke detectors near the hot work job that may be affected by the work, arrange to have the Hanford Fire Department bypass the affected detectors before the hot work begins. Arrange to have the Hanford Fire Department restore the detectors to service as soon as possible after the job is finished or when the area becomes unoccupied for the day, whichever comes first.

NOTE: Depending on the operation, smoke detectors may need to be covered or removed during the hot work operations.

12. Ensure fire watches are assigned and dedicated to each hot work job, and that assigned personnel are trained and understand the following:
  - The specific area to be fire watched
  - Potential fire hazards (to personnel and property)
  - Appropriate emergency procedures and actions
  - Methods for sounding the alarm(s)
  - Procedure for manually activating fire suppression systems

- Received fire watch training which includes hands-on portable fire extinguisher training (Lesson Plan Number 044400).

#### 4.2 Before Starting Hot Work Outside Designated Areas

After preparing or verifying the work site, the job supervisor ensures the necessary personnel are ready to begin work and gets the necessary approvals.

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| Job Supervisor      | <ol style="list-style-type: none"><li>1. Complete a Tank Farm Contractor Hot Work Permit (<a href="#">A-6003-692</a>) before each job. Fax (373-5846) a copy of the completed permit to the Hanford Fire Department for hazard communication purposes.</li><li>2. Verify required fire watches are provided with a fully charged and operable fire extinguisher at the work site, and that it is kept available throughout the entire job.</li></ol> <p>NOTE: Ensure that a separate extinguisher is brought to the work site. Do <u>NOT</u> take a permanently mounted extinguisher in the facility from its storage rack, except in case of fire.</p>  |
| Facility Supervisor | <ol style="list-style-type: none"><li>3. Give advice to personnel involved with the hot work about flammable and combustible materials or hazardous conditions.</li><li>4. Authorize the hot work by approving the Hot Work Permit.</li></ol>  |
| Job Supervisor      | <ol style="list-style-type: none"><li>5. If a job remains inactive for longer than one shift after the Hot Work Permit is approved, verify again the conditions and initial the Hot Work Permit form before beginning work.</li><li>6. Verify employees have the appropriate personal protective equipment for the hazards (i.e., infrared and ultraviolet radiation, radiant heat, fumes, sparks, and hot slag).</li><li>7. Ensure workers (e.g., cutters, welders, helpers, fire watches, and other personnel adjacent to the welding areas) are protected by leaving hazardous area or by using proper eye protection, protective clothing, shielding, screens, etc., as appropriate.</li></ol> |

#### 4.3 During Hot Work Outside Designated Areas

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| Hot Workers | <ol style="list-style-type: none"><li>1. Before starting, complete the WRPS Job Hazard Analysis Checklist (<a href="#">A-6004-101</a>) or the Laboratory Job Hazard Analysis Checklist (<a href="#">A-6005-338</a>) and get approval from the job supervisor.</li><li>2. Perform hot work only when the conditions required by the Hot Work Permit are met.</li></ol> |
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Oncoming Supervisor,  
Hot Worker, Fire Watch

3. If the shift changes or supervisors, hot worker(s), or fire watches are relieved, review and initial the Hot Work Permit before starting the shift.

Fire Watch

4. Monitor the work in progress. Be alert for:
  - Smoke/fire in the clothing of the welder or other personnel in the hot work area
  - Combustible construction materials or building contents within 35 feet of the work
  - Openings that expose combustible materials in adjacent areas within 35 feet of the work
  - Combustible materials that could be ignited by sparks (even if the material is more than 35 feet from the work)
  - Combustible materials on the interior or on the other side of metal partitions, walls, floors, or ceilings that could be ignited by conduction or radiant heating.

NOTE: The fire watch shall conduct only those duties of the fire watch. The fire watch shall not provide assistance as a welder's helper, supervisor, or any task that may detract from the duties of a fire watch.

Job Supervisor

5. Maintain the fire watch for at least 30 minutes after stopping hot work.
6. After the job is completed or when the area is becoming unoccupied for the day:
  - a. Contact the Hanford Fire Department if any detectors were bypassed, covered, or removed for the work; suppression systems were bypassed; or special precautions were taken to avoid accidental operation, to restore the system(s) to normal service.
  - b. Remove anything that may obstruct the fire system (e.g., covers over smoke detectors, obstructions to sprinkler pattern).
  - c. Clean up the area and leave it in a safe condition.

#### 4.4 Hot Work in Confined Spaces/Areas

These additional steps are required for hot work in or on confined spaces/areas (e.g., tanks, small rooms, etc.). Also, see [TFC-ESHQ-S IH-C-04](#) for confined space entry requirements.

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| Job Supervisor | <ol style="list-style-type: none"><li>1. If the job requires hot work on/in piping, tanks or similar confined spaces used for flammable/combustible liquids or gases:<ol style="list-style-type: none"><li>a. Before starting, complete the WRPS Job Hazard Analysis (<a href="#">A-6004-101</a>) or the Laboratory Job Hazard Analysis Checklist (<a href="#">A-6005-338</a>).</li><li>b. Ensure the interior of items are cleaned of residue.</li><li>c. Have the atmosphere monitored to ensure the applicable concentration does not exceed 10% of the lower explosive limit. Purging may be required to prevent ignition of flammable atmospheres.</li><li>d. During the work, perform atmospheric testing at least every eight hours or more frequently if required by the worksite hazard analysis or work package.</li><li>e. Ensure adequate ventilation is provided where personnel entry is necessary. (Consult with an industrial hygienist.)</li></ol></li><li>2. If oxidizers are involved, contact the FPE for assistance.</li></ol> |
| Hot Workers    | <ol style="list-style-type: none"><li>3. If arc welding in a confined space will be suspended or interrupted for any substantial period of time (such as during lunch, extended breaks, or overnight):<ol style="list-style-type: none"><li>a. Remove all electrodes from the holders.</li><li>b. Place the holders where they will not be accidentally touched.</li><li>c. Disconnect (turn off) the machine power supply.</li></ol></li><li>4. If gas welding or cutting in a confined space is to be suspended or interrupted for any substantial period of time (such as during lunch or overnight), shut off the gas supply (and drain the lines) at some point outside the confined area to eliminate the possibility of gas escaping through leaks or improperly closed valves. If practical, remove the torch and hose from the confined space.</li></ol>   |

#### 4.5 Designated Hot Work Areas

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| Job Supervisor | <ol style="list-style-type: none"><li>1. Verify the area has been reviewed and meets the requirements for a designated hot work area.</li><li>2. Verify a portable fire extinguisher is readily accessible.</li><li>3. Verify the designated area has adequate ventilation.</li></ol> |
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| Job Supervisor/<br>Hot Workers | 4. Verify that hot work equipment to be used (e.g., torches, regulators, pressure-reducing valves, manifolds, etc.) is listed or approved by a nationally recognized testing laboratory for the intended use and is in good condition.  |
|                                | 5. Verify that oxygen-fuel gas systems (e.g., oxygen/acetylene welders) are equipped with listed and/or approved backflow valves and pressure-relief devices.   |
| Job Supervisor                 | 6. Verify employees have the appropriate personal protective equipment. Hazards include, but are not limited to, infrared and ultraviolet radiation, radiant heat, fumes, sparks and hot slag.  |
|                                | 7. Ensure that all workers (i.e., cutters, welders, helpers, fire watches, and personnel adjacent to the welding areas) shall be protected by removing themselves from exposure to the hazards or by use of proper eye protection, protective clothing, shielding, screens, etc., as appropriate. |

## 5.0 DEFINITIONS

Designated hot work area. Any area that meets all the criteria (as applicable) in items 1 through 6 below. A fire watch is normally not required for designated hot work areas but may be provided as determined appropriate or necessary by the job supervisor/facility manager.

Designated hot work areas are authorized by a fire marshal permit. This applies to all contractors and subcontractors performing work for the TOC. To authorize a designated hot work area, no substitute process may be used.

NOTE: The TOC FPEs are deputies of the Hanford Fire Marshal's Office. They will issue the required permit. See [TFC-ESHQ-FP-STD-01](#) for information on obtaining a permit.

1. A Hanford Fire Marshal Permit shall be posted at the designated hot work area. The permit demonstrates that the area has been reviewed to ensure it qualifies as a designated hot work area and will have any restrictions listed.
2. The job supervisor/facility manager is responsible to ensure the area is maintained in accordance with the requirements in this procedure and the Hanford Fire Marshal Permit.
3. The area will be:
  - a. Fire resistive or non-combustible construction
  - b. If fire resistive or non-combustible construction is not provided, have non-combustible/fire retardant barriers available for protection against hot slag and sparks
  - c. There shall be no unprotected combustible materials (including floors, ceilings, wall or duct openings) within 35 feet of the designated area unless appropriately protected (e.g., fire blankets, fire screens, etc.).

NOTE: For “low hazard” hot work, the separation distance and protective measures for items b and c above shall be as determined by the job supervisor, in consultation with the FPE.

4. The hot work area shall be provided with a fully charged, permanently mounted, and serviced portable fire extinguisher (minimum 2A-10BC rating). (The extinguisher shall be maintained in accordance with NFPA 10 requirements)
5. The area shall have adequate ventilation (consult industrial hygiene, if necessary). Follow Section 4.4 of this procedure, if applicable.
6. Inside buildings where high hazard hot work is performed, the designated area shall be provided with visual protection, i.e., surrounded by a booth or screen constructed of one of the following materials:
  - Metal
  - Flame resistant fabric that is opaque to most optical radiation
  - Transparent colored polyvinyl chloride material that is formulated with a flame retardant and an ultraviolet-visible absorber in the range of 200 to 3000 nanometers.
7. Anyone performing high hazard hot work will wear fire resistant/retardant personal protective equipment (e.g., fire resistant/retardant coveralls, jackets, or leathers [non-radiological areas]). The job supervisor and the FPE must approve exceptions to wearing fire resistant/retardant personal protective equipment. Such exceptions must be listed on the Tank Operations Contractor Hot Work Permit and include the signature of the FPE and job supervisor.

NOTE: Under no circumstances will the dedicated fire watch AND the fire resistant/retardant personal protective equipment requirement be waived.

## 6.0 RECORDS

The following records are generated during the performance of this procedure:

<b>Record Description</b>	<b>Vital Record Y/N</b>	<b>QA Record Y/N</b>	<b>QA Record Retention L/NP</b>	<b>NARA Retention Schedule</b>	<b>Other Retention Requirements</b>	<b>Records Custodian</b>
Tank Operations Contractor Hot Work Permit (A-6003-692)	N	Y	NP	ADM-17.321b	N/A	Base Ops Planning/RCO Planning

The identified record custodian is responsible for record retention in accordance with [TFC-BSM-IRM\\_DC-C-02](#) and [TFC-OPS-MAINT-C-01](#).

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## **7.0 SOURCES**

### **7.1 Requirements**

1. DOE O 420.1B, "Facility Safety."
2. National Fire Protection Association, Standard 51B, "Cutting and Welding Processes."
3. ENS-ENG-IP-05 R0, "ORP Fire Protection Program."
4. 10 CFR 851, "Worker Safety and Health Program."
5. 29 CFR 1926.350, "Welding and Cutting."
6. 29 CFR 1926.351, "Arc Welding and Cutting."
7. 29 CFR 1926.352, "Fire Prevention."
8. 29 CFR 1926.353, "Ventilation and Protection In Welding, Cutting, and Heating."
9. 29 CFR 1926.354, "Welding, Cutting, and Heating in Way of Preservative Coatings."
10. 29 CFR 1910, Subpart Q, "Welding, Cutting, and Brazing."

### **7.2 References**

1. [TFC-BSM-IRM\\_DC-C-02](#), "Records Management."
2. [TFC-ESHQ-FP-STD-01](#), "Fire Marshal Permits, Combustible Controls, and Construction/ Occupancy Requirements."
3. [TFC-ESHQ-S\\_IH-C-04](#), "Permit Required Confined Space."
4. [TFC-ESHQ-S\\_SAF-C-02](#), "Job Hazard Analysis."
5. [TFC-OPS-MAINT-C-01](#), "Tank Operations Contractor Work Control."